Fall 2011

High Plains Herald

National Weather Service
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The National Weather Service provides weather forecasts and warnings for the protection of life and property and the enhancement of the national economy.

Inside this Issue:

Thanks for Making Our Open House a Success

By John Griffith & Debbie Winston

We want to say Thank You to all of you who came out to make our Open House such a success. We estimate that 300 people braved the cold dreary weather to visit our office.

Employees were waiting at computer stations to show everyone our operations using radar and satellite imagery and computer models, as well as our data collection procedures.

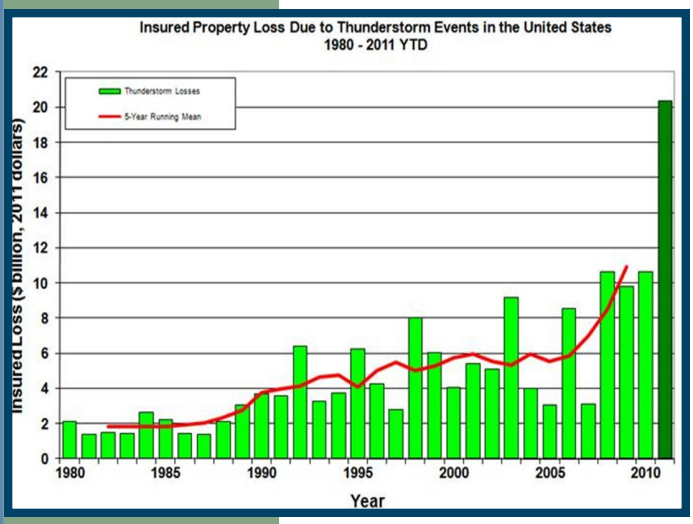
Our office hydrological focal point in conjunction with the USGS, set up a flood plane model for demonstrations and our Observation Program

We were also joined by the Wyoming Office of Homeland Security and Laramie County Emergency Managers with information on Emergency Response in our area. The U. S. Forest Service teamed up with our Fire Weather Focal Point to provide information about Fire Weather and the Shy-WY amateur radio club demonstrated how they assist us during severe weather.

With the recent record breaking natural disasters in the U. S., the National Weather Service in Cheyenne wants to let you know that we are ready to help our community prepare and be part of building a “Weather Ready Nation”.

Building a Weather Ready Nation

By Debbie Winston



2011 was a year of weather extremes including over 600 fatalities and $35 billion in economic losses. There were devastating blizzards, historic floods, the Pacific tsunami, over 1600 tornados and over 6 million acres burned in wild fires due to exceptional drought. Average thunderstorm losses have increased 500% since 1980.

Population growth and demographic changes, dependence on technology and other changes in our society have made many population centers more vulnerable to weather extremes. The National Weather Service has introduced their "*Weather Ready Nation*" campaign with goals of improving forecasts and working with partners to create adaptable community responses to severe weather. We want the nation to be prepared for and able to respond quickly to high impact weather events.

The National Weather Service is introducing new science and technology to better understand public needs and running test projects to provide more information. The NWS is deploying emergency response specialists to work with local emergency responders and they are testing new warning processes to increase warning lead time. These projects are especially important in high risk areas with population growth and demographic changes.

Due to our growing dependence on technology, our society has become more susceptible to impacts from space weather which affects our power grids, communications and more. This will only continue to grow over time, so the NWS is working to increase awareness and accuracy of predicting these disturbances with more lead time. We are also working to improve the Nation's ability to manage water resources. These efforts include improving warnings and seasonal outlooks, and sharing technology and information.

The National Weather Service Cheyenne is ready to help the communities in our County Warning Area prepare for severe weather and become part of building a "*Weather Ready Nation*."

Inside this Issue:

2011 Convective Season Events Summary

By Mike Jamski

A strong upper level disturbance moving northeast from the central Rockies interacted with a moist and unstable upslope flow to produce severe thunderstorms during the late afternoon of May 9. A weak tornado briefly touched down just east of Harrison, NE. There were numerous reports of golf ball to baseball sized hail south of Chadron, NE.

Thunderstorms on June 8 produced quarter to golf ball sized hail in southeast Wyoming. On June 11, an intense thunderstorm produced a brief weak tornado and wind damage to a semi-trailer near Yoder, WY, and quarter sized hail in Albin, WY. Additional storms developed in the western Panhandle with large hail and wind gusts to 70 mph. A few weak tornadoes briefly touched down north of Redbird, WY on June 12. Early evening thunderstorms on June 13 generated large hail in Cheyenne County. June 16 was an active day with numerous reports of large hail, wind gusts to 70 mph, and flash flooding across extreme southeast Wyoming into the western Panhandle. A weak tornado was reported near Mitchell, NE on June 18. Afternoon thunderstorms produced heavy rain, large hail and funnel clouds in and around Cheyenne on June 19. These storms later caused heavy rain and flash flooding in Kimball and Cheyenne counties. Hail to baseball size and wind gusts to 70 mph accompanied storms in the western Panhandle on June 24. Thunderstorms on June 25 produced a few weak tornadoes and funnel clouds, as well as large hail in the western Panhandle. Softball sized hail fell at Sidney, NE. Large hail and wind gusts to 60 mph occurred in Scotts Bluff and Banner counties on June 26. Wind gusts to 60 mph accompanied thunderstorms in Albany, Carbon and Cheyenne counties on June 29. Afternoon storms on June 30 produced straight-line winds and quarter sized hail from Cheyenne to Wheatland, and near Chadron and Sidney.

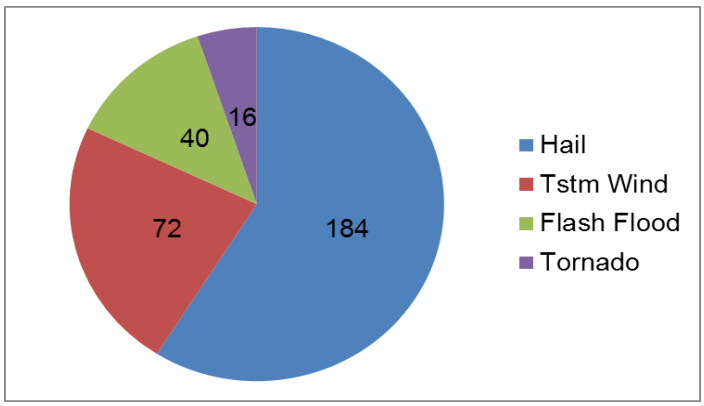
2011 Convective Season Events Summary Continued

By Mike Jamski

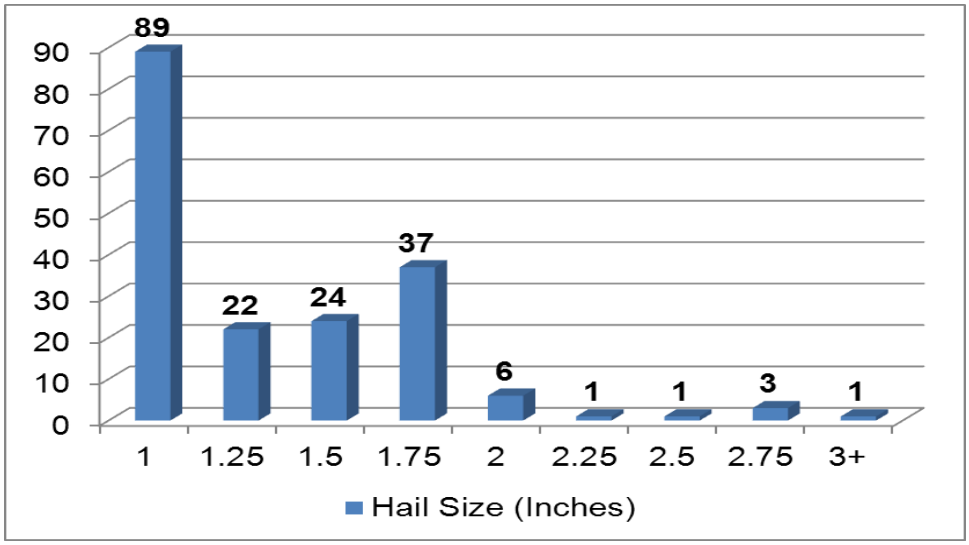
Thunderstorms on July 2 unleashed large hail and flash flooding in Banner, Scotts Bluff, Goshen and Converse counties. Several weak tornadoes were also sighted in Goshen County. Several funnel clouds were observed in the northern Panhandle on July 4. 70 mph winds accompanied a storm near Sidney on July 8. Afternoon storms on July 11 brought large hail and wind gusts in excess of 60 mph in Scotts Bluff, Cheyenne, Dawes and Niobrara counties. Intense thunderstorms produced widespread large hail and flash flooding in Laramie County on July 12. The hail caused significant property damage in Cheyenne, with many intersections inundated by as much as six feet of water. Torrential rain caused flash flooding in Cheyenne and Kimball counties early on July 13. Later that day, storms delivered strong winds and hail in southeast Wyoming. On July 14, a brief weak tornado and hail occurred northeast of Harrisburg, NE, while hail and flash flooding occurred northeast of Cheyenne. Strong winds and hail accompanied July 16 storms in Goshen, Platte, Morrill and Kimball counties. A July 19 squall line wrought straight-line winds of 60 to 70 mph in the western Panhandle. Laramie County was raked by strong winds, large hail and flash flooding on July 24. On July 25, quarter size hail fell near Crawford, NE.

Flash flooding occurred from slow moving storms in north Cheyenne on August 3. A thunderstorm wind gust of 72 mph was recorded at Alliance on August 4. An August 7 storm deposited half dollar sized hail near Dalton, NE. Thunderstorms on August 9 produced large hail, along with some strong winds in and around Sidney, and in Goshen and Laramie counties. On August 10, ping pong to golf ball sized hail fell near Pine Bluffs, WY. Large hail was reported south of Bushnell, NE on August 14. The next day, outflow winds from dissipating storms reached 63 mph east of Sinclair, WY. On August 29, storms in the western Panhandle produced some flash flooding, large hail, strong winds, and a weak tornado.

There were 312 severe weather reports throughout the NWS Cheyenne County Warning Area. The figure below classifies the type and number of reports received:



Of the 184 hail reports, the next figure depicts the number and size of hailstones (inches in diameter):



Inside this Issue:

"Afternoon storms on July 11 brought large hail and wind..."

Flash Flood Event on July 18, 2011

By Mike Weiland

Thunderstorms moved over the Snowy Range of southeast Wyoming in the late evening of July 18 through early morning of July 19, 2011. A storm moved across the Brush Creek area on Highway 130, west of Centennial between 9:00 PM and midnight with the heavier rainfall falling between 10:00 PM and 11:00 PM. This storm produced rainfall rates of one half to one inch per hour with Doppler radar estimated between 1.00 and 1.25 inches which mainly fell between 10:00 PM and 11:00 PM.

The environment was favorable for storms producing heavy rainfall over the area. The monsoonal moisture was in place and the amount of moisture available in the air was over 150% of normal. The mention of heavy rain through midnight was included in the forecasts as of 10 AM that morning. A Small Stream Flood Advisory was issued for the area at 1238 AM July 19 which continued through 3:24 AM.

Some rainfall totals from nearby sites were 0.76 inches, 4 miles northwest of Ryan Park (or 16 miles southeast of Saratoga). Also 1.20 inches fell at a site 17 miles east-northeast of Riverside. Other locations in the area received between 0.20 and 0.30 inches of rain during that time.

Brush Creek on July 19, 2011

River	Stage Before Rain	Stage After Rain
Brush Creek: 4 miles northwest of Ryan Park	2.5 feet	4.5 feet
Barrett Creek: 2 miles northwest of Ryan Park	4.2 feet	4.8 feet
Cedar Creek: 6 miles north-northwest of Ryan Park	2.3 feet	2.7 feet
North Brush Creek: 17 miles southeast of Saratoga	3.5 feet	5.2 feet

Areal Summary of the 2011 Summer

By Rich Emanuel

The summer of 2011 (which meteorologically is the period June through August) for this region turned out to be warmer than average. Rainfall was generally close to or a little above normal, though there were some notable extremes.

The summer was characterized by a slightly cool start and a warm finish. June was close to or slightly cooler than normal over the area but warm conditions settled into the area for July and especially August. Averaged all together the summer was warmer than average across the area.

Temperatures: The following table summarizes the monthly and overall summer average temperatures and the departures from normal for select sites over the area:

City	June average temp.	Departure from normal*	July average temp.	Departure from normal*	August average temp.	Departure from normal*	June-Aug average temp.	Jun-Aug departure from normal*
Cheyenne	61.7	-0.4	71.2	+1.8	70.8	+3.2	67.9	+1.5
Laramie	57.4	+0.2	66.3	+2.3	66.1	+3.8	63.3	+2.2
Rawlins	58.0	-1.3	68.7	+1.7	68.3	+3.1	65.0	+1.2
Chadron	65.5	-0.4	77.5	+3.9	76.0	+3.8	73.0	+2.4
Scottsbluff	67.3	+0.1	77.4	+2.7	76.1	+4.2	73.6	+2.5
Sidney	67.4	-0.2	77.8	+2.6	76.8	+3.5	74.0	+2.0

*based on new normals for the period 1981-2010

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Areal Summary of the 2011 Summer Continued

By Rich Emanuel

As can be seen from the table, August was particularly warm across the area, with Laramie recording its warmest August on record. Cheyenne recorded its 3rd warmest August on record while Scottsbluff had their 4th warmest August on record. Rawlins had their 6th warmest August while Chadron tied for their 11th warmest on record. A persistent area of high pressure in the upper atmosphere and generally drier conditions allowed temperatures to become significantly warmer than average in August.

The warmest and coldest temperatures of the summer and the number of days with highs 90 or higher are depicted for select cities in the following table:

City	Highest Temperature	Date(s)	Lowest Temperature	Date	Number of days 90 or above	Average number of days 90 or above
Cheyenne	94	July 4 & Aug. 25	38	June 10	15	12
Laramie	90	August 25	27	June 3	1	2
Rawlins	93	July 25	29	June 3	12	11
Chadron	105	July 31 & Aug. 25	40	June 4	48	42
Scottsbluff	102	August 23	42	June 10	48	45
Sidney	102	July 31 & Aug. 23	40	June 10	50	33

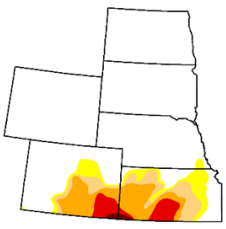
Precipitation: The summer started off a little dry across much of southeast Wyoming into the northern Nebraska Panhandle while generous rains fell across much of the southern Nebraska Panhandle. Near to above average rains fell across much of the area in July with Cheyenne recording their 2nd wettest July on record. Dry conditions persisted over parts of the northern Nebraska panhandle however. August saw below normal rainfall across most of the area. The outstanding exception was at Sidney, Nebraska where an impressive 16.19 inches of rain was recorded, resulting in the wettest summer on record for Sidney. At the other extreme was Chadron which had a very dry summer with only 2.48 inches recorded there. It was the driest August on record for Chadron as only a trace of rainfall was officially recorded.

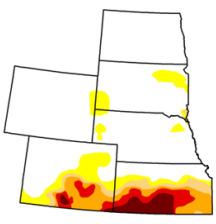
The following table tabulates the March through May precipitation amounts and departures from average:

City	June rainfall and departure	July rainfall and departure	August rainfall and departure	Total rainfall and departure
Cheyenne	2.02 (-0.32)	5.64 (+3.45)	1.56 (-0.39)	9.22 (+2.74)
Laramie	1.36 (-0.18)	1.17 (-0.26)	0.65 (-0.58)	3.18 (-1.02)
Rawlins	0.68 (-0.35)	1.18 (+0.34)	0.54 (-0.22)	2.40 (-0.23)
Chadron	1.85 (-1.39)	0.63 (-1.48)	Trace (-1.58)	2.48 (-4.45)
Scottsbluff	3.74 (+0.89)	1.76 (-0.07)	0.23 (-1.07)	5.73 (-0.25)
Sidney	6.91 (+3.73)	4.98 (+2.02)	4.30 (+2.14)	16.19 (+7.79)

* based on new normals for the period 1981-2010

Drought Status: The dry August across much of the region did result in a return of a few areas of unusually dry (D0) status over parts of the Nebraska Panhandle Much of the region remained free of drought, as can be seen on the following maps:





May 31, 2011 Drought Status

August 30, 2011 Drought Status

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Volunteers needed for CoCoRahs

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2011 Convective Warning Performance Summary

By Mike Jamski

The NWS is monitored for its performance via national GPRA (Government Performance and Results Act) goals each fiscal year. Benchmarks were established for tornado (TOR) and flash flood (FFW) warnings. In FY11, GPRA metrics for TOR accuracy (POD) was 70%, false alarm ratio (FAR) 72%, and lead time 12 minutes. For FFW, accuracy was 72% and lead time 38 minutes. FY11 TOR POD rose to 81%, FFW POD decreased to 93%, and FFW lead time increased to 64 minutes. Figures 1 and 2 depict a two-year comparison of WFO Cheyenne and GPRA metrics. FY11 TOR POD improved 6% from FY10, however FAR rose 9% and lead time decreased by 1.5 minutes. FY11 FFW POD decreased by 1% from FY10, however FAR fell 19% and lead time increased 13 minutes. Good situational awareness, pattern recognition, and verification efforts were crucial to this year's performance, especially with flash floods.

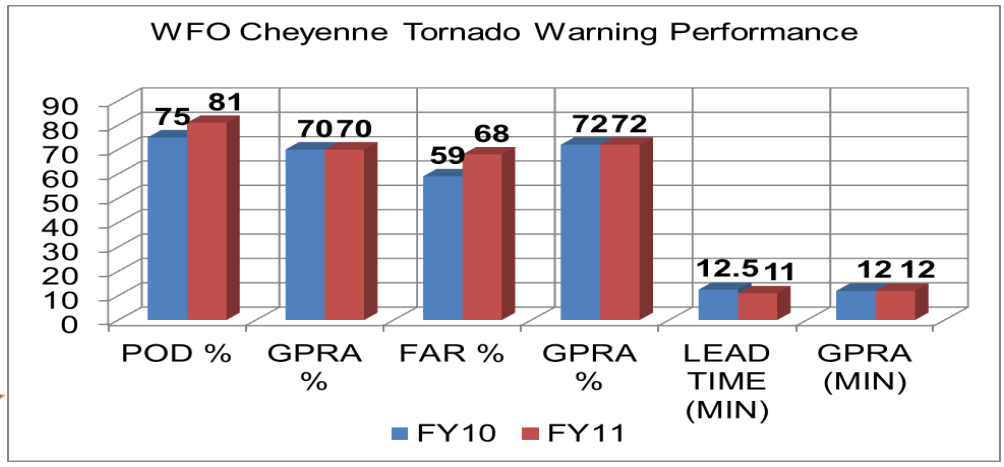


Figure 1. Tornado Warning Performance

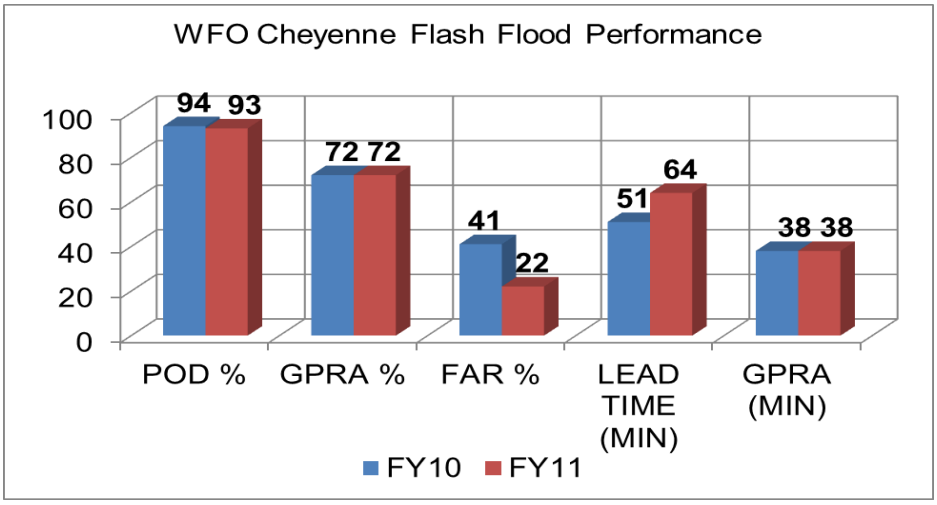
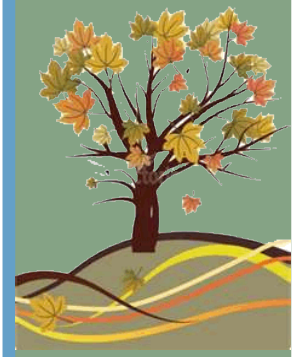


Figure 2. Flash Flood Performance

CoCoRaHs

This acronym stands for Community Collaborative Rain Hail and Snow Network. It is a volunteer program for those collecting daily rain and snow information. Anyone who would like to do so in the future please visit www.cocorahs.org or call Mike Weiland at 772-2227 for more information.

Inside this Issue:



Area Climate Outlook for Fall September—November 2011

By Rich Emanuel

September through November Climatology:

Overall average temperatures decline during the period, as can be expected with the amount of daylight decreasing each day as autumn progresses. Average low temperatures across the region east of the Wyoming mountains start off in the mid 40's in September, then cool into the lower 20's during November. Average high temperatures over lower elevations tend to be in the 70's in September, cool through October, reaching the mid to upper 40's for November. For locations like Laramie and Rawlins, average lows are around 40 degrees in September, but cool into the upper teens to around 20 for the month of November. Average highs are near 70 degrees in September, then cool to near 40 degrees in November. The average first freezes in fall tend to occur in the mid to latter part of September across the area.

Average total precipitation declines during this period as cooler and drier air masses become common over the region. Average precipitation across the entire regions is typically around an inch in September, and then decreases in October, reaching around six tenths of an inch for November. Snow makes its initial appearance especially over the mountains in September, and spread over the plains in October and November. Amounts over lower elevations range from about an inch near the mountains in September, rising to about 5 to 8 inches in November.

Current situation:

La Nina redeveloped over the tropical Pacific Ocean during the month of August after having faded earlier in the summer. La Nina is expected to gradually strengthen during the fall and winter but its ultimate strength is uncertain. The tendency is for significant La Nina's in one season to be followed by a weaker La Nina the following season, and this appears it will be the case as La Nina was moderate to strong intensity last fall and winter. The 90 day outlooks reflect the expected La Nina conditions, which locally bodes for a windier than average cool season with a delayed onset of cold weather.

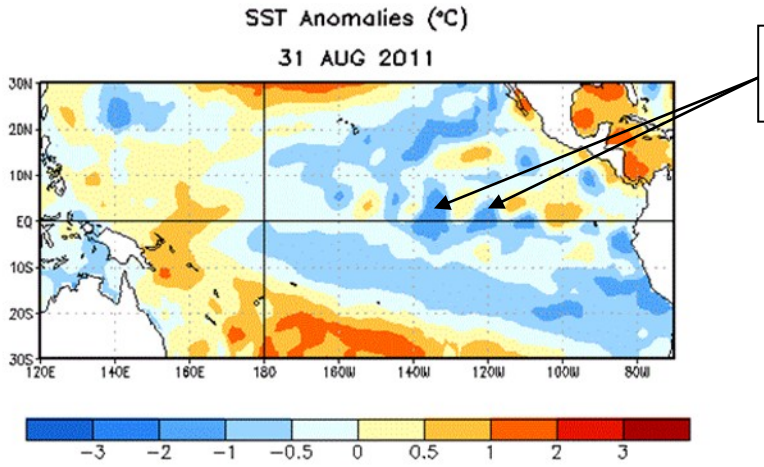


Figure 1. Average sea surface temperature (SST) anomalies (°C) for the week centered on 31 August 2011. Anomalies are computed with respect to the 1971-2000 base period weekly means (Xue et al. 2003, *J. Climate*, **16**, 1601-1612).

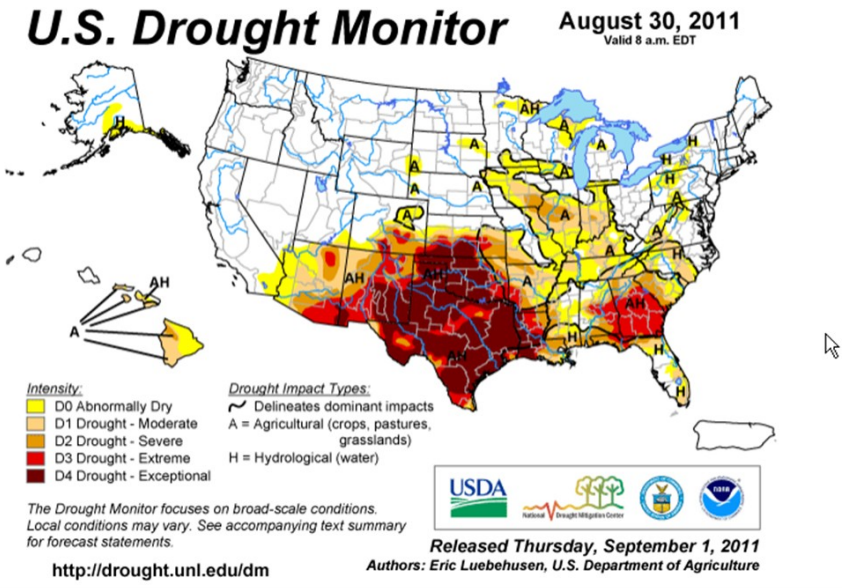
More information can be found at the Climate Prediction Center's website here: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/

Drought Status:

Most areas in southeast Wyoming and the Nebraska Panhandle remained out of drought status thanks to ample spring and early summer rains across much of the area, quite unlike the southern plains. The exceptions were over parts of the Nebraska Panhandle where some areas, especially the northern Panhandle, missed out on decent rainfall. As a result abnormally dry conditions exist there currently, as can be seen in Figure 2 on page 9:

Area Climate Outlook for Fall Continued

By Rich Emanuel



The latest drought status and more information can be found at the **National Drought Mitigation Centers** website here:

Close up views of Wyoming and Nebraska Drought status.

September through November Outlook

Temperature:

The Climate Prediction Center's three month temperature outlook for this area indicates that there is a slightly enhanced chance that temperatures will be above average over most of Wyoming and Nebraska for the period, as is the case for much of the center of the country, as depicted by Figure 3. Note the annotation EC means "Equal Chances" .

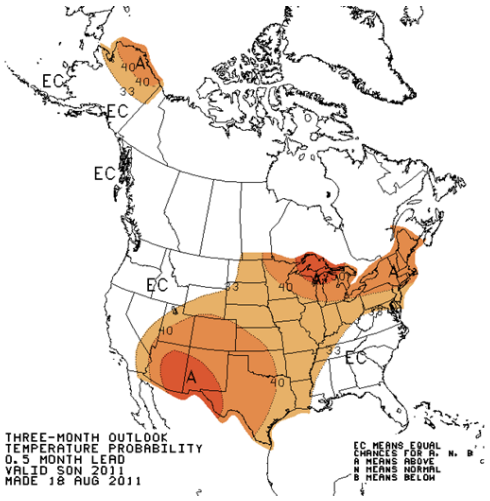


Figure 3: September – November 2011 Temperature Outlook

Precipitation:

For precipitation, there is no significant signal or pattern that favors any one category over the other across most of Wyoming thus equal chances exist for above, near, or below average precipitation for that area. Slightly enhanced chances for above normal precipitation exist across most of the Nebraska panhandle and extreme northeast Wyoming during the period.

Inside this Issue:

Email cys.info@noaa.gov with comments